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divisions of Trichobranchiata and Phyllobranchiata, with the Dendrobranchiata (Penæidea and Sergestidæ), intercalated. Each of these divisions is divided into two sections, the Normalia and the Aberrantia. The family Galethæidæ belongs among the Trichobranchiata Aberrantia, while the rest of the old group Anomoura form the Aberrantia of the Phyllobranchiate section. These groups will form the subject of a report by Professor John R. Henderson.

Recent works upon lacustrine faunas have shown that copepods, and especially those of the genus Diaptomus, are both more numerous in species and more widely distributed than is generally supposed. Most of the ordinary types have been confounded under the name of *Diaptomus castor*, so that until now it has not been possible to speak with any approach to certainty of the geographical distribution of any species. M.M. de Guerne and Richard have now, thanks to the numerous documents they have studied on the subject, given a map of the distribution of Diaptomus, and proved that it may be regarded as a cosmopolitan genus.

ENTOMOLOGY.[1]

Entomology for Beginners.—The most important Entomological event of the past month is the appearance of an elementary text-book by Dr. Packard.[2] The following review of this work has been prepared by a prominent Entomologist at our request.—*J. H. C.*

Dr. Packard's Entomology for Beginners fills a niche which has long been vacant, and supplies a need which has been so pressing, particularly of late years, that it will be and should be warmly welcomed; and wherever imperfections may be noticed by the critical reader, these should not make him forget that Dr. Packard has, in writing this book, given us really the first treatise of its class in the English language. We find after careful reading that an astonishing amount of information has been crowded into its three hundred odd pages, and that the plan of the work is on the whole satisfactory. The author has in his preface outlined his ideas as to the probable usefulness of the work with sufficient modesty, and, placing ourselves in the attitude of the first two classes of his probable readers, namely the beginners and the amateurs or dilettante entomologists, we find that we have little of which to complain. The first class of readers, however, whom he hopes to reach, the farmer, the fruit-grower, and the gardener, the book will hardly satisfy as a hand-book. No one, however, can write a book on this subject for farmers unless he is a farmer himself.

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[1] This Department is edited by Prof. J. H. Comstock, Cornell University, Ithaca, N. Y., to whom communications, books for notice, etc., should be sent.

[2] Entomology for Beginners, by Dr. A. S. Packard, M.D., Ph.D., New York. Henry Holt & Co. 1888.

While our first impression was that Dr. Packard had made a mistake in adopting in this elementary work the division of the class into sixteen orders, our maturer opinion coincides with his own judgment. Brauer's classification, or some slight modification of it, is bound to be generally adopted. The sooner this is brought about the better, and in no way could a ready adoption be more speedily achieved than by teaching the system to younger entomologists, and to beginners in the study. Dr. Packard's substitution of *Plectoptera* and *Mecaptera* for *Ephemeridœ* and *Panorpatœ* is, of course, done in the interest of uniformity, but we regret his apparent slip in the etymology of his word *Mecaptera.* This leads us naturally to criticise the glossary, in that for less than half of the words defined is the derivation given. The same incompleteness is seen in the acknowledgments of illustrations. Credit for many is given, but many others are unacknowledged, leaving the erroneous impression that all the latter are original with the book.

We are somewhat disappointed with the chapter on collecting, preserving, and rearing. Although most of the published notes have been brought together, the chapter is too much a clipped one, and many well-known points unpublished are omitted. For example, Prof. Riley's description of his breeding-cage, published no less than fifteen years ago, is reproduced with its accompanying figure, while no word is said of the later improvements which Prof. Riley and others are using, and with which the author was familiar. Similarly, in the matter of inflating larvæ, no mention is made of the tin ovens generally used, or of the method recently described of inflating several larvæ simultaneously.

The short family characterizations given in small type will be useful in many instances, but it seems to us a mistake, and a certain discouragement to the student, to insert such definitions as those given on page 126, under the Diptera, viz.:—

Family Asteidæ.—Front bristle above.
Family Phytomyzidæ.—Front bristly.
Family Agromyzidæ.—Front with strong bristles.

It also seems to us that in a work of this character strict uniformity in sub-family terminations should have been followed, whether previously adopted by other authors or not.

But we have found enough fault. We anticipate that the book will do a great deal of good. Many teachers, we know, will heave a sigh of relief upon seeing it, and we have no doubt but that its sales will be gratifying both to the author and to the clear-sighted publishers.

AN INTRODUCTION TO ENTOMOLOGY.—By the time this number of the NATURALIST reaches its readers, the first half of an elementary text-book of Entomology, prepared by the editor of this department, will have been published.[1] This part includes the grammar of the science, and half of the systematic part. It contains many original illustrations, drawn and engraved by Mrs. Comstock. The following extract from the preface of this work will indicate the author's plan of treatment of the subject:

"This work has been prepared to meet the demand for a text-book which shall enable students to acquire a thorough knowledge of the elementary principles of Entomology, and to classify insects by means of analytical keys similar to those used in Botany. By means of the keys the student can readily determine to what family any insect of which he has a specimen belongs. In many cases tables of genera are also given, and the more common or conspicuous species in each family have been described.

"Although much pains has been taken to render easy the classification of specimens, an effort has been made to give the mere determination of the names of insects a very subordinate place. The groups of insects have been fully characterized, so that their relative affinities may be learned, and much space has been given to accounts of the habits and transformations of the forms described. As the needs of agricultural students have been kept constantly in view, those species that are of economic importance have been described as fully as practicable, and particular attention has been given to descriptions of the methods of destroying those that are noxious, or of preventing their ravages.

"The pronunciation of the technical terms has been indicated by marking the accented vowel, and at the same time indicating its length *when the term is pronounced as an English word.*"

SYNOPSIS OF NORTH AMERICAN DIPTERA.—All North American students of Entomology will welcome the work just published by Dr. Williston.[2] This work consists chiefly of analytical keys and characterizations of families. There is an introduction, in which the terminology of Diptera is given; then follows an analytical table of families, and, except in the case of the Nematocera and Muscidæ, tables of genera are also given. There is appended to the work a Bibliography of the species described since the publication of Osten Sacken's catalogue. The whole forms a very convenient manual, and it cannot fail to stimulate the study of this much neglected order.

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[1] An Introduction to Entomology, by John Henry Comstock, Professor of Entomology in Cornell University, and formerly United States Entomologist. Published by the author, Ithaca, N. Y. Part I. $2.00.

[2] Synopsis of the families and genera of North American Diptera, with Bibliography and new species, 1878–1888, by Samuel W. Williston. 8vo., pp. 84. New Haven, J. T. Hataway. $1.00.

EMBRYOLOGY.[1]

Notes on the Development of Holothuria.—The following interesting facts are taken from a note, not intended for publication, which was addressed to Prof. W. K. Brooks from Mr. Charles L. Edwards, who has been investigating the development of *Holuthuria* at Green Turtle Key, Bahama Islands. As they refer to a type with an abbreviated development within the egg, it has been considered desirable to reproduce them.

"I tried artificial fecundation for some time without result. Then putting males and females together in a tub I could get no fertilized eggs. Finally, about two weeks ago (Aug. 1st), I arranged a live box, as recommended by Selenka, and with excellent results. I have since had no trouble in gathering fertilized eggs and upon four occasions. These Holothurians prove very interesting. The egg is quite opaque, but I have made out the following general conclusions from surface views, but as I have not yet had the eggs just at fertilization, for the animals do not generally discharge the eggs until five or six hours after being put into the box, I have not the exact age of the stages.

"The segmentation is regular and is completed in about seven or eight hours. The blastosphere is formed in about twelve hours. Then gastrulation takes place. Then follows a very complex development within the egg-shell. To all appearances the embryo passes through the Auricularia stage of free-swimming Holothurian larvæ. It then takes the form of the adult, develops five oral tentacles, and so formed, bursts forth from the shell about the fifth day and creeps about on the bottom of the dish. It has developed the beginnings of the spines in the egg, and these with tentacles now grow rapidly during the free larval state. On the sixth day a tentacle arises at the posterior end which grows rapidly, until on the eighth day it is longer than the oral tentacles. About this time a favorite attitude of the larva is to erect itself on the posterior

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[1] **Edited by Prof. Jno. A. Ryder, Univ. of Penna., Philadelphia.**